



Bioterrorism: An Overview

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Bioterrorism

- ▶ Intentional or threatened use of viruses, bacteria, fungi, or toxins from living organisms to produce death or disease in humans, animals, or plants



History of Biological Warfare

- ▶ 14th Century: Plague at Kaffa





History of Biological Warfare

- ▶ 18th Century: Smallpox Blankets





History of Biological Warfare

► 20th Century:

- 1943: USA program launched
- 1953: Defensive program established
- 1969: Offensive program disbanded



Biological Warfare Agreements

- ▶ 1925 Geneva Protocol
- ▶ 1972 Biological Weapons Convention
- ▶ 1975 Geneva Conventions Ratified

Bioterrorism





Biотerrorism:

Who are 1st Responders?

- ▶ Primary Care Personnel
- ▶ Hospital ER Staff
- ▶ EMS Personnel
- ▶ Public Health Professionals
- ▶ Other Emergency Preparedness Personnel
- ▶ Laboratory Personnel
- ▶ Law Enforcement



Potential Bioterrorism Agents

► Bacterial Agents

- Anthrax
- Brucellosis
- Cholera
- Plague, Pneumonic
- Tularemia
- Q Fever

► Viruses

- Smallpox
- VEE
- VHF

► Biological Toxins

- Botulinum
- Staph Entero-B
- Ricin
- T-2 Mycotoxins

Source: U.S. A.M.R.I.I.D.



Biological Agents of Highest Concern

- ▶ *Variola major* (Smallpox)
- ▶ *Bacillus anthracis* (Anthrax)
- ▶ *Yersinia pestis* (Plague)
- ▶ *Francisella tularensis* (Tularemia)
- ▶ Botulinum toxin (Botulism)
- ▶ Filoviruses and Arenaviruses (Viral hemorrhagic fevers)
- ▶ ALL suspected or confirmed cases should be reported to health authorities immediately



Smallpox





Parapox



Anthrax



Advantages of Biologics as Weapons

- ▶ Infectious via aerosol
- ▶ Organisms fairly stable in environment
- ▶ Susceptible civilian populations
- ▶ High morbidity and mortality
- ▶ Person-to-person transmission (smallpox, plague, VHF)
- ▶ Difficult to diagnose and/or treat
- ▶ Previous development for BW



Advantages of Biologics as Weapons

- ▶ Easy to obtain
- ▶ Inexpensive to produce
- ▶ Potential for dissemination over large geographic area
- ▶ Creates panic
- ▶ Can overwhelm medical services
- ▶ Perpetrators escape easily



Bioterrorism: How Real is the Threat?

Hoax vs. Actual BT Event



Anthrax *Bioterrorism*

Anthrax hoax at federal building delays 91 in L.A.

ASSOCIATED PRESS

LOS ANGELES — Ninety-one people were held for almost eight hours as a health precaution after an anonymous threat claimed that anthrax had been released into the air ducts of a federal building.

The people were given antibiotics and special suits to wear over their clothes Friday before preliminary tests showed none of them had been infected with the potentially deadly bacterium.

Authorities held the people, most of them U.S. Bankruptcy Court staff members, as firefighters and FBI investigators conducted field tests for anthrax spores in the building.

They also examined the employees for possible infection.

"Doctors and the FBI said nothing came up on exams," said Bob Collis, Los Angeles Fire Department spokesman.

An anonymous threat claimed anthrax had been planted in the

ventilation system.

Tests on culture samples taken from air conditioning and heating ducts were inconclusive, said Jonathan Fielding, a spokesman for the Los Angeles County Health Department. Definitive lab results were expected Tuesday.

"I think the chances are very, very high that there is not a problem. On the other hand, we have to act out of an abundance of caution," Fielding said.

While waiting for the conclusive

results, the 91 people were instructed to take doses of cipro, an antibiotic. They were given special suits to wear over their clothes and sent home.

Health officials told them to wash their clothes and to shower immediately at home.

"They are going to, in essence, be decontaminating themselves," Fielding said.

The FBI would not release details of how the threat was delivered.

The building houses a bankruptcy court and parole offices for federal offenders, said Mary Filipini of the U.S. General Services Administration.

Authorities shut a section of Burbank Boulevard in Woodland Hills as they investigated the threat.

Preliminary symptoms of the infection typically set in within a few hours to exposure. Anthrax spores take three to five days to

incubate inside the human body and if untreated, can cause death. Anthrax does not require quarantine, however, and is treatable with antibiotics.

Letters threatening anthrax releases have been sent to various locations around the country in the last few months, according to FBI spokesman John Hoon.

On Thursday, a Westwood office building received an anthrax threat in the form of a letter that was later discovered to be a hoax.

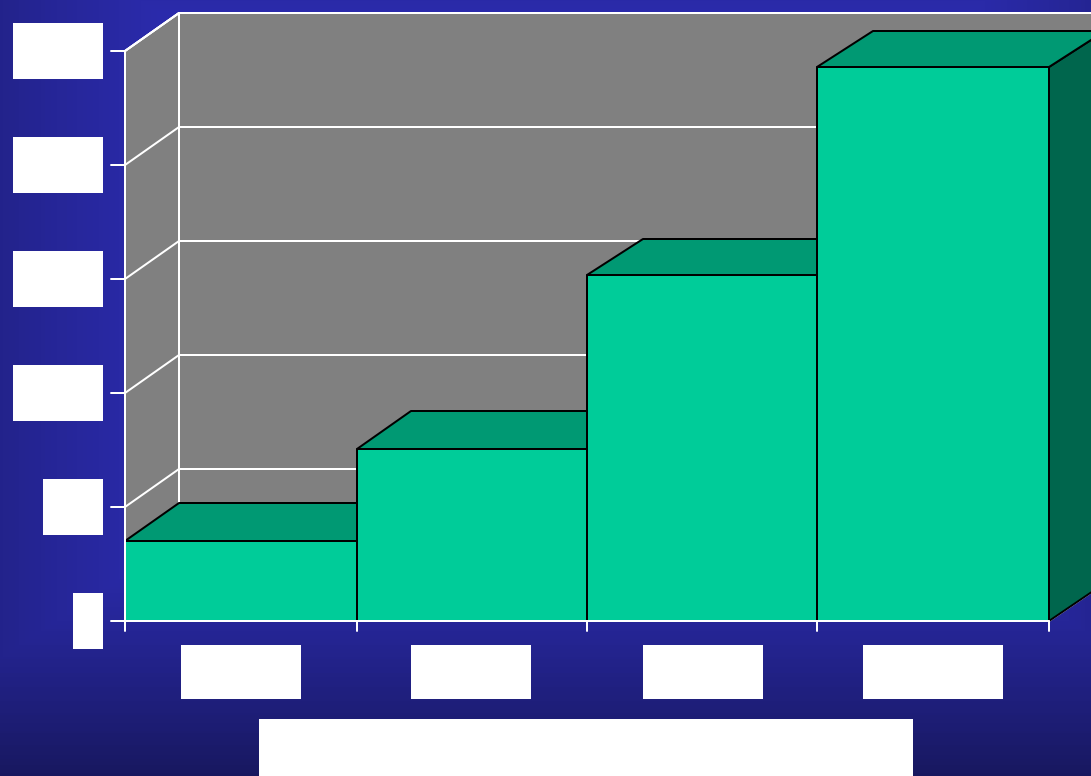
San Francisco Chronicle, 20 December 1998



(COURTESY KTLA)



Threats reported to FBI



Source: FBI personal communication





Chemical & Biological Terrorism

- 1984: The Dalles, Oregon, *Salmonella* (salad bar)
- 1991: Minnesota, ricin toxin (hoax)
- 1994: Tokyo, Sarin and biological attacks
- 1995: Arkansas, ricin toxin (hoax)
- 1995: Ohio, *Yersinia pestis* (sent in mail)
- 1997: Washington DC, “Anthrax” (hoax)
- 1998: Nevada , non-lethal strain of *B. anthracis*
- 1998: Multiple “Anthrax” hoaxes



Salmonellosis Caused by Intentional Contamination

- ✍ The Dalles, Oregon in Fall of 1984
- ✍ 751 cases of *Salmonella*
- ✍ Eating at salad bars in 10 restaurants
- ✍ Criminal investigation identified perpetrators as followers of Bhagwan Shree Rajneesh

SOURCE: Torok et al. JAMA 1997;278:389



Source: ASAHI SHIMBUN SIPA



Clinical Status of Patients Exposed to Sari on March 21, 1995

Dead	8
Critical	17
Severe	37
Moderate	984
Outpatient	4,073
Unknown	391
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Total	5,510



Shigellosis Caused by Intentional Contamination

- ✍ Dallas, Texas in Fall of 1996
- ✍ 12 (27%) of 45 laboratory workers in a large medical center had severe diarrheal illness
- ✍ 8 (67%) had positive stool cultures for *S. dysenteriae* type 2
- ✍ Eating muffins or donuts in staff break room implicated
- ✍ PFGE patterns indistinguishable for stool, muffin, and laboratory stock isolates
- ✍ Criminal investigation in progress

SOURCE: Kolavic et al. JAMA 1997;278:396



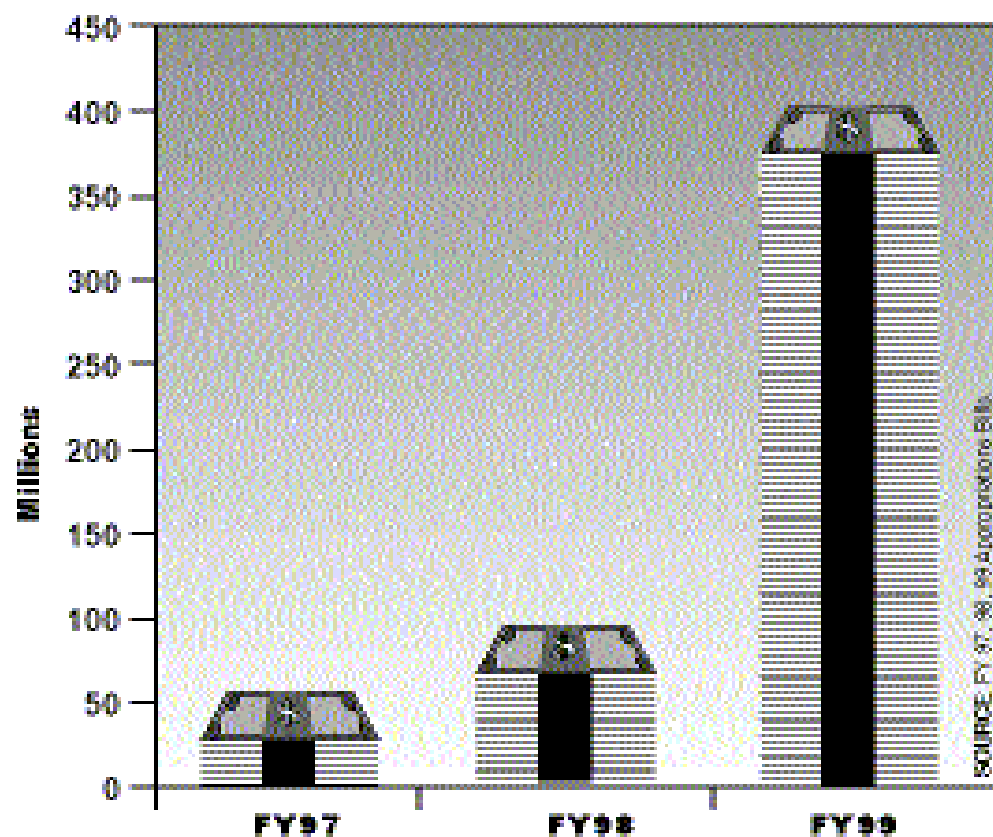
Federal Agencies Involved in Bioterrorism

- ▶ NSC
- ▶ DOD
- ▶ FEMA
- ▶ DOJ
- ▶ DHHS
- ▶ Treasury
- ▶ EPA
- ▶ FBI
- ▶ PHS
- ▶ CDC
- ▶ Secret Service
- ▶ USDA
- ▶ FDA
- ▶ SBCCOM
- ▶ USAMRIID
- ▶ OEP



Cost of Bioterrorism

U.S. Government Spending On Civilian Chem/Bio Defense



Includes appropriations under Defense, Justice, and Health and Human Services.



Agent Transmission



Routes of Infection

- ▶ **Skin**
 - Cuts
 - Abrasions
 - Mucosal membranes



Routes of Infection

► Gastrointestinal

– Food

- Potentially significant route of delivery
- Secondary to either purposeful or accidental exposure to aerosol

– Water

- Capacity to affect large numbers of people
- Dilution factor
- Water treatment may be effective in removal of agents



Routes of Infection

► Respiratory

- Inhalation of spores, droplets & aerosols
- Aerosols most effective delivery method
- 1-5µ droplet most effective



Medical Response to Bioterrorism



Medical Response

- ▶ **Pre-exposure**
 - active immunization
 - prophylaxis
 - identification of threat/use



Medical Response

► Incubation period

- diagnosis
- active and passive immunization
- antimicrobial or supportive therapy



Medical Response

► Overt disease

- diagnosis
- treatment
 - may not be available
 - may overwhelm system
 - may be less effective
- direct patient care will predominate



Public Health Response to Bioterrorism



Priorities for Public Health Preparedness

- ▶ Emergency Preparedness and Response
- ▶ Enhance Surveillance and Epidemiology
- ▶ Enhance Laboratory Capacity
- ▶ Enhance Information Technology
- ▶ Stockpile

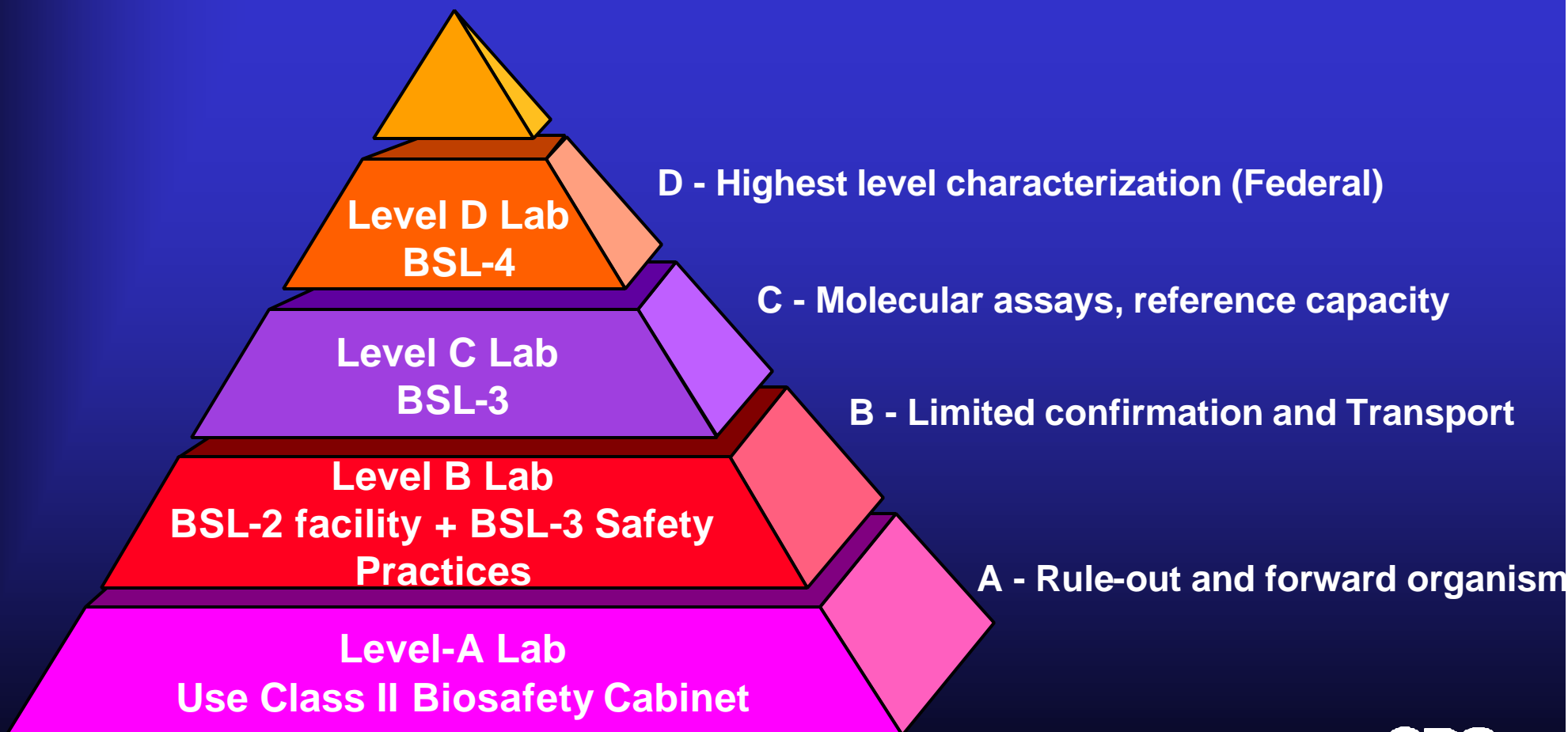


Components of a Public Health Response to Bioterrorism

- * Detection - Health Surveillance
- * Rapid Laboratory Diagnosis
- * Epidemiologic Investigation
- * Implementation of Control Measures



Laboratory Response Network For Bioterrorism





CDC BT Rapid Response and Advanced Technology Lab

- ▶ BSL -3
- ▶ Agent Identification and Specimen Triage
- ▶ Refer to and Assist Specialty Lab Confirmation
- ▶ Evaluate Rapid Detection Technology
- ▶ Rapid Response Team



Bioterrorism:

What Can Be Done?

- ▶ Awareness
- ▶ Laboratory Preparedness
- ▶ Plan in place
- ▶ Individual & collective protection
- ▶ Detection & characterization



Bioterrorism:

What Can Be Done?

- ▶ Emergency response
- ▶ Measures to Protect the Public's Health and Safety
- ▶ Treatment
- ▶ Safe practices